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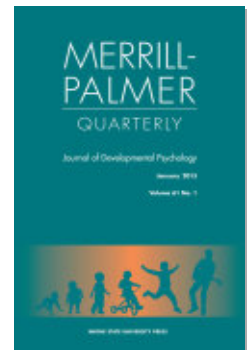
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## **Long-term Effects of Parents' Education on Children's Educational and Occupational Success: Mediation by Family Interactions, Child Aggression, and Teenage Aspirations**

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## Long-term Effects of Parents' Education on Children's Educational and Occupational Success

### Mediation by Family Interactions, Child Aggression, and Teenage Aspirations

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We examine the prediction of individuals' educational and occupational success at age 48 from contextual and personal variables assessed during their middle childhood and late adolescence. We focus particularly on the predictive role of the parents' educational level during middle childhood, controlling for other indices of socioeconomic status and children's IQ, and the mediating roles of negative family interactions, childhood behavior, and late adolescent aspirations. Data come from the Columbia County Longitudinal Study, which began in 1960 when all 856 third graders in a semirural county in New York State were interviewed along with their parents; participants were reinterviewed at ages 19, 30, and 48 (Eron et al., 1971; Huesmann et al., 2002). Parents' educational level when the child was 8 years old significantly predicted educational and occupational success for the child 40 years later. Structural models showed that parental educational level had no direct effects on child educational level or occupational prestige at age 48 but had significant indirect effects that were independent of the other predictor variables' effects. These indirect effects were

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mediated through age 19 educational aspirations and age 19 educational level. These results provide strong support for the unique predictive role of parental education on adult outcomes 40 years later and underscore the developmental importance of mediators of parent education effects such as late adolescent achievement and achievement-related aspirations.

Parental educational level is an important predictor of children's educational and behavioral outcomes (Davis-Kean, 2005; Dearing, McCartney, & Taylor, 2001; Duncan, Brooks-Gunn, & Klebanov, 1994; Haveman & Wolfe, 1995; Nagin & Tremblay, 2001; Smith, Brooks-Gunn, & Klebanov, 1997). The majority of research on the ways in which parental education shapes child outcomes has been conducted through cross-sectional correlational analyses or short-term longitudinal designs in which parents and children are tracked through the child's adolescent years. Our main goals in the current study were to examine long-term effects on children's educational and occupational success of their parents' educational level while controlling for other indices of family socioeconomic status (SES) and the children's own intelligence and to examine possible mediators of the effects of parents' education on children's educational and occupational outcomes. Following theory and research on family process models (e.g., Conger et al., 2002; McLoyd, 1989), we expected that indices of family SES, including parent education, would predict the quality of family interactions and child behavior. Next, based on social-cognitive-ecological models (e.g., Guerra & Huesmann, 2004; Huesmann, 1998; Huesmann, Eron, & Yarmel, 1987), we expected that parental education, the quality of family interactions, and child behavior would shape, by late adolescence, educational achievement and aspirations for future educational and occupational success. Finally, following Eccles's expectancy-value model (Eccles, 1993; Frome & Eccles, 1998), we predicted that late adolescent aspirations for future success would affect actual educational and occupational success in adulthood. We use data from the Columbia County Longitudinal Study (CCLS), a 40-year developmental study initiated in 1960 with data collected most recently in 2000 (Eron, Walder, & Lefkowitz, 1971; Lefkowitz, Eron, Walder, & Huesmann, 1977; Huesmann, Dubow, Eron, Boxer, Slegers, & Miller, 2002; Huesmann, Eron, Lefkowitz, & Walder, 1984).

### *Family Contextual Influences during Middle Childhood*

In terms of SES factors, the positive link between SES and children's achievement is well established (Sirin, 2005; White, 1982). McLoyd's (1989, 1998) seminal literature reviews also have documented well the relation of poverty and low SES to a range of negative child outcomes,

including low IQ, educational attainment and achievement, and social-emotional problems. Parental education is an important index of SES, and as noted it predicts children's educational and behavioral outcomes. However, McLoyd has pointed out the value of distinguishing among various indices of family SES, including parental education, persistent versus transitory poverty, income, and parental occupational status, because studies have found that income level and poverty might be stronger predictors of children's cognitive outcomes compared to other SES indices (e.g., Duncan et al., 1994; Stipek, 1998). Thus, in the present study we control for other indices of SES when considering the effects of parental education.

In fact, research suggests that parental education is indeed an important and significant unique predictor of child achievement. For example, in an analysis of data from several large-scale developmental studies, Duncan and Brooks-Gunn (1997) concluded that maternal education was linked significantly to children's intellectual outcomes even after controlling for a variety of other SES indicators such as household income. Davis-Kean (2005) found direct effects of parental education, but not income, on European American children's standardized achievement scores; both parental education and income exerted indirect effects on parents' achievement-fostering behaviors, and subsequently children's achievement, through their effects on parents' educational expectations.

Thus far we have focused on the literature on family SES correlates of children's academic and behavioral adjustment. However, along with those contemporaneous links between SES and children's outcomes, longitudinal research dating back to groundbreaking status attainment models (e.g., Blau & Duncan, 1967; Duncan, Featherman, & Duncan, 1972) indicates clearly that family of origin SES accounts meaningfully for educational and occupational attainment during late adolescence and into adulthood (e.g., Caspi, Wright, Moffitt, & Silva, 1998; Johnson et al., 1983; Sobolewski & Amato, 2005; for a review, see Whitson & Keller, 2004). For example, Caspi et al. (1998) reported that lower parental occupational status of children ages 3–5 and 7–9 predicted a higher risk of the child having periods of unemployment when making the transition from adolescence to adulthood. Johnson et al. (1983) found that mothers' and fathers' educational level and fathers' occupational status were related positively to their children's adulthood occupational status. Few studies, however, are prospective in nature and span such a long period of time (i.e., a 40-year period from childhood to middle adulthood). Also, few studies include a wide range of contextual and personal predictor variables from childhood and potential mediators of the effects of those variables from adolescence.

*Potential Mediators of the Effects of Family Contextual Influences during Childhood on Adolescent and Adult Outcomes*

Family process models (e.g., Conger et al., 2002; McLoyd, 1989; Mistry, Vanderwater, Huston, & McLoyd, 2002) have proposed that the effects of socioeconomic stress (e.g., financial strain, unstable employment) on child outcomes are mediated through parenting stress and family interaction patterns (e.g., parental depressed mood; lower levels of warmth, nurturance, and monitoring of children). That is, family structural variables such as parental education and income affect the level of actual interactions within the family and concomitantly the child's behavior. It is well established within broader social learning models (e.g., Huesmann, 1998) that parents exert substantial influence on their children's behavior. For example, children exposed to more rejecting and aggressive parenting contexts as well as interparental conflict display greater aggression (Cummings & Davies, 1994; Eron et al., 1971; Huesmann et al., 1984; Lefkowitz et al., 1977), and the effects between negative parenting and child aggression are bidirectional (Patterson, 1982). Presumably, children learn aggressive problem-solving styles as a result of repeated exposure to such models, and in turn parents use more power assertive techniques to manage their children's behavior.

Researchers also have shown that behavioral problems such as early aggression impair children's academic and intellectual development over time (e.g., Hinshaw, 1992; Huesmann, Eron, & Yarmel, 1987). Stipek (1998) has argued that behavioral problems affect young children's opportunities to learn because these youths often are punished for their behavior and might develop conflictual relationships with teachers, thus leading to negative attitudes about school and lowered academic success. Thus, it is possible that low SES (including low parental educational levels) could affect negative family interaction patterns, which can influence child behavior problems (measured in our study by aggression) and in turn affect lowered academic and achievement-oriented attitudes over time.

Parent education and family interaction patterns during childhood also might be linked more directly to the child's developing academic success and achievement-oriented attitudes. In the general social learning and social-cognitive framework (Bandura, 1986), behavior is shaped in part through observational and direct learning experiences. Those experiences lead to the formation of internalized cognitive scripts, values, and beliefs that guide and maintain behavior over time (Anderson & Huesmann, 2003; Huesmann, 1998). According to Eccles (e.g., Eccles, 1993; Eccles, Vida, & Barber, 2004; Eccles, Wigfield, & Schiefele, 1998), this cognitive process accounts for the emergence and persistence of achievement-related behaviors and ultimately

to successful achievement. Eccles's framework emphasizes in particular the importance of children's expectations for success, with parents assuming the role of "expectancy socializers" (Frome & Eccles, 1998, p. 437).

Thus, for example, a child exposed to parents who model achievement-oriented behavior (e.g., obtaining advanced degrees, reading frequently, encouraging a strong work ethic) and provide achievement-oriented opportunities (e.g., library and museum trips, after-school enrichment programs, educational books and videos) should develop the guiding belief that achievement is to be valued, pursued, and anticipated. This belief should then in turn promote successful outcomes across development, including high school graduation, the pursuit of higher learning, and the acquisition of high-prestige occupations. Not surprisingly, there are positive relations between parents' levels of education and parents' expectations for their children's success (Davis-Kean, 2005), suggesting that more highly educated parents actively encourage their children to develop high expectations of their own. Importantly, on the other hand, McLoyd's (1989) review found that parents who experience difficult economic times have children who are more pessimistic about their educational and vocational futures.

In the current study, we assume a broad social-cognitive-ecological (Guerra & Huesmann, 2004; Metropolitan Area Child Study Research Group, 2002; also "developmental-ecological," Dodge & Pettit, 2003) perspective on behavior development. This view proposes that it is the cumulative influence both of childhood environmental-contextual factors (e.g., parental education, family interactions, school climate, neighborhood efficacy) and individual-personal factors (e.g., IQ and aggression) that shapes enduring cognitive styles (e.g., achievement orientation, hostile worldview) in adolescence. Once formed, those styles allow for the prediction of functioning into adulthood above and beyond the effects of the earlier influences. In this view, then, cognitive factors such as beliefs and expectations present during adolescence serve as internal links between early contextual and personal factors and later outcomes.

### *The Present Study*

Based on data from the CCLS, we first examine how well we can predict two adult outcomes at age 48 (educational and occupational attainment) from parental educational levels during middle childhood (age 8). Because our cognitive-ecological model emphasizes the family as the more important unit than the individual parent, we focus on the overall family climate. For example, we assess the educational climate of the family environment by using the average of the two parents' levels of education ( $r = .53$ ,  $p <$

.01). Next, we examine mediators of the long-term effects of parents' educational levels. Our mediational model posits that lower parental educational levels predict more negative family interactions and associated child behavior problems (i.e., aggression) even after accounting for the effects of other indices of family SES and child IQ. In turn, we expected that these childhood contextual and personal variables would predict the child's educational achievement and aspirations during late adolescence (age 19), which in turn would predict adult educational and occupational outcomes. Based on variations by gender in the relations among these types of variables observed by Eccles and others (e.g., Eccles, 1993), we consider the moderating role of gender in our structural models.

## Method

### *Design of the Columbia County Longitudinal Study*

The CCLS (Eron, et al., 1971; Lefkowitz et al., 1977; Huesmann et al., 1984) began in 1960 and has so far culminated in the collection of four waves of data over a 40-year span on children who were living in Columbia County, New York, in 1960. The dominant issues in selecting the sample were cost, geographic proximity, availability, representativeness, and low mobility. The entire population of third graders (G2;  $N = 856$ ; 436 boys, 420 girls) in the county participated in the first phase of this project in 1960 (Eron et al., 1971). At that time, 85% of the participants' mothers and 71% of their fathers also were interviewed (G1). Follow-up assessments were conducted in both 1970 ( $N = 427$ ) and 1981 ( $N = 409$ ). We do not present findings from the 1981 assessment in this article; the interested reader is directed to Huesmann et al. (1984) for more information. In our most recent wave of data collection (Huesmann et al., 2002), between 1999 and 2002, we reinterviewed 284 of the G2 participants in person and another 239 by mail or telephone, for a total of 523 (268 males, 255 females). Analyses for this article are based on data collected about the participants during Wave 1 (age 8), Wave 2 (age 19), and Wave 4 (age 48). We also draw on data provided about the original participants by their parents in 1960.

### *Description of Sample in Waves 1, 2, and 4*

Columbia County, New York, is semirural with a few heavy industries. Of its approximately 63,000 current residents, about 7,000 live in the largest city and county seat, Hudson. The county has had a depressed economy for the last 50 years, although it has begun to benefit from the encroachment of

the New York City metropolitan area. At the time the study was started, there were 38 public and private third-grade classrooms in the county, all of which were included in the sample. Over 90% of the original sample of 856 participants was Caucasian; 51% were male, and 49% were female. The number of ethnic minorities (i.e., 3% African American, < 1% Asian or Pacific Islanders, < 1% Hispanic) was too small to allow separate analyses. The participants came from a broad range of socioeconomic backgrounds (mean of 4.3 on Warner's scale of fathers' occupational status, i.e., middle class) (Warner, Meeker, & Eells, 1960) and displayed a wide range of intelligence (mean IQ of 104,  $SD = 14$ ). The 427 participants (211 boys, 216 girls) who were reinterviewed in 1970 had a modal age of 19 years and had completed 12.6 years of education on average. Their fathers' occupational status was again predominantly middle class. For 25% of the 1970 sample, current IQ scores were available ( $M = 109$ ,  $SD = 12$ ).

For the 523 participants reinterviewed during 1999–2002, the mean age was 48.85 years ( $SD = .81$ ), the average education level was between some college and a college degree, the average occupational attainment reflected middle-class status (the average occupational prestige code using Stevens and Hoisington's [1987] prestige scores reflected jobs such as sales, bookkeepers, secretaries), and 69% of the original participants were living with their spouses.

*Differences between the original sample and the 1999–2002 resample.* In the 40-year follow-up, we collected some data on 80% (683) of our original participants and interviewed 61% (523) of them extensively. The number of relocated participants who refused to be interviewed (despite substantial financial incentives) was higher than expected ( $N = 144$ ), but the completed reinterview rate of 61% over 40 years still provides us with a substantial sample for analysis. However, we must ask whether attrition introduced bias into the sample. In most longitudinal studies, more aggressive and antisocial participants are somewhat less likely to be resampled. In fact, participants reinterviewed at age 19 were less aggressive than those not interviewed at age 19 (Lefkowitz et al., 1977), but there was no significant difference in age 8 aggression between the reinterviewed Wave 4 (age 48) participants and those who were not reinterviewed. Furthermore, the plots of the distributions revealed that many of the high-aggressive participants were resampled, and there was no substantial restriction of range that might have made it hard to detect relations between aggression and other variables. We also compared New York state criminal justice records of those subjects who participated in interviews in 1999–2002 with those who did not: the mean number of arrests was not significantly higher for those in the noninterviewed group. There were no significant differences in 1960



father's education or value of family housing between resampled participants and dropouts, but resampled participants scored slightly but significantly higher than noninterviewed participants on age 8 IQ. The average difference was 2.5 (range for dropouts = 55–133,  $SD = 14.7$ ; range for resampled = 52–142,  $SD = 14.4$ ), but the ranges of the distributions of the resampled participants were not noticeably restricted.

### *Procedures in Waves 1, 2, and 4*

The methods of data collection across the first three waves of the CCLS have been reported elsewhere (e.g., Eron et al., 1971; Lefkowitz et al., 1977; Huesmann et al., 1984, 2002). In Wave 1 in 1960, two main sources of data were utilized: classroom-based peer nominations and extensive individual parent interviews. In Wave 2 in 1970, participants were administered a variety of self-report measures as well as peer nominations in individual interviews at a field office. During Wave 1, written parental consent was obtained along with the children's assent. In Wave 2, the children themselves, at age 19, provided their own written consent.

For the 40-year follow-up, interviews were conducted by computer in a field office and by mail or telephone for those participants who could not come to the office.<sup>1</sup> Interviews in the field office were up to four hours in duration for original participants, three hours for their second persons/spouses, and two hours for their children. Original participants were paid \$100, second persons/spouses were paid \$75, and children were paid \$50 for their participation. The participants again provided their written consent to participate.

### *Measures*

*Socioeconomic family-contextual factors during middle childhood.* For these measures, if two parents were interviewed in 1960, their scores were averaged: (a) parents' educational level (Eron et al., 1971) reflects the parents' levels of educational attainment, ranging from 1 = under 7 years to 7 =

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<sup>1</sup> There were mean differences by interview type for both adult outcome measures. Compared to participants interviewed in person, those interviewed by mail or phone had higher levels of education and occupational status. However, a series of hierarchical regressions showed no evidence that interview type moderated the relations of the middle childhood personal or contextual factors with the adult outcomes. The obtained differences are not surprising given that geographic mobility is highly related to SES. Personal interviews were obtained almost exclusively from participants who still lived in or near Columbia County, New York.

graduate/professional training; (b) father's occupation (Warner et al., 1960) ranges from 1 = laborer to 7 = professional; and (c) value of housing (Eron et al., 1971) ranges from 1 = inexpensive rental to 4 = expensive owned.

*Negative family interaction during middle childhood.* This index (see Eron et al., 1971) is an average of the standardized scores on three measures. (a) Parental rejection is the sum of scores on 10 items about how dissatisfied the parent is with the child, for example, "Are you satisfied with your child's manners?" and "Does your child read as well as he/she should?" (yes/no) ( $\alpha = .75$ ). (b) To determine parents' endorsement of hitting the child as a form of punishment, the parent was asked whether he or she would use each of several specific forms of punishment in response to vignettes depicting child transgressions, for example, "If you saw [your son] grab things from another child, would you. . . ." Two physical punishments were included: "spank your child until he/she cries?" and "slap your child in the face?" (yes/no). (c) Parental disharmony measures the amount and seriousness of disputes between the parents. It is the sum of 10 items of the form "Do you or your spouse ever leave the house during an argument?" and "Do arguments between you and your spouse ever settle anything?" (yes/no) ( $\alpha = .77$ ).

*Child's individual-personal variables during middle childhood.* We included in our analyses two individual-personal variables that were assessed when the child was 8 years of age. (a) The child's IQ was assessed with the California Short-Form Test of Mental Maturity (Sullivan, Clark, & Tiegs, 1957). Kuder-Richardson reliability coefficients range from .87 to .89 across grades; the total score correlates approximately .75 with other IQ measures. (b) Child aggression is defined by Eron et al. (1971) as "an act whose goal response is injury to another object" (p. 30). Their 10 peer-nominated aggression items cover physical (e.g., "Who pushes and shoves other children?"), verbal (e.g., "Who says mean things?"), acquisitive (e.g., "Who takes other children's things without asking?"), and indirect (e.g., "Who makes up stories and lies to get other children into trouble?") aggressive acts. The score represents the proportion of times the child was nominated by classmates on any of 10 items. This measure is described in detail elsewhere (Eron et al., 1971; Huesmann et al., 1984), has been widely used, and has an  $\alpha = .90$  in cross-national samples (Huesmann & Eron, 1986).

*Late adolescent (age 19) educational achievement and aspirations.* (a) Participants' level of education was coded as 1 = less than high school, 2 = completed high school, or 3 = at least 1 year after high school. (b) For educational aspirations, G2 participants responded to the item "What is the greatest amount of education you expect to have during your life?" along a 6-point scale (1 = less than high school to 6 = graduate education)

(Lefkowitz et al., 1977). (c) For occupational aspirations, participants responded to the item "What kind of work do you expect to be doing 10 years from now?" This was scored on a 7-point scale ranging from 1 = laborer to 7 = professional in line with Warner's classification scheme (Warner et al., 1960).

*Adult (age 48) outcomes.* (a) For educational level, participants reported their educational attainment along a 7-point scale (0 = did not finish high school, 1 = some high school, 2 = high school graduate, 3 = some college or technical school, 4 = bachelors or RN degree, 5 = some graduate school, 6 = master's degree, 7 = doctorate or law degree). (b) Occupational prestige was rated using prestige codes following Stevens and Hoisington (1987). Prestige codes are provided for 889 specific occupations within 13 occupational categories (e.g., executive, administrative, and managerial; professional specialty; technicians; sales; protective service; mechanics and repairers; and machine operators and inspectors). Higher codes indicate greater prestige. The codes range from 153 (ushers) to 810 (physicians). Two raters coded the participants' occupations. On a subsample of 162 occupations coded by each rater, the correlation between their assigned codes was  $r = .81$ .

## Results

### *Gender Differences in the Study Variables*

*T* tests were computed to examine gender differences in the age 8 family contextual (parental educational level, father's occupation, value of housing, negative family interaction) and personal variables (child IQ and aggression), the age 19 adolescent mediators (educational and occupational aspirations, educational attainment), and the age 48 outcomes (educational level and occupational prestige). There were no gender differences in age 8 parental educational level, father's occupation, and value of housing, but there were gender differences in two of the middle childhood negative family interaction measures: (a) parents reported higher levels of rejection (dissatisfaction) toward boys than toward girls ( $t[705] = 4.32, p < .01$ ), and (b) parents reported higher levels of endorsement of hitting as a form of punishment toward their boys than toward their girls ( $t[697] = 1.98, p < .05$ ). In terms of the age 8 personal variables, boys were rated as more aggressive by their classroom peers compared to girls ( $t[854] = 7.74, p < .01$ ), but there were no gender differences in IQ. Regarding the age 19 hypothesized mediators, there were no gender differences in educational attainment or occupational aspirations, but boys had higher educational aspirations than did girls ( $t[416] = 2.76, p < .01$ ).

At age 48 there were no gender differences in educational attainment or occupational prestige. Given the number of variables for which there were significant gender differences, the remaining analyses were computed separately by gender.

### *Relations of the Middle Childhood Parental Educational Level to the Adult Outcomes*

Table 1 shows the correlation matrix of the middle childhood and adolescent predictor variables with the adult outcome variables. For both genders, nearly all of the age 8 family contextual and child personal variables were significantly related modestly to moderately to the two adult outcomes. For example, parents' educational level during middle childhood was positively related to educational attainment and occupational prestige 40 years later. The child's IQ was also positively related to educational attainment and to occupational prestige 40 years later. Finally, aggressiveness during middle childhood was significantly related negatively to educational attainment and to occupational prestige 40 years later. Table 1 also shows that parental educational level, child aggression, and child intelligence during middle childhood were correlated with other contextual variables (e.g., the other socioeconomic indices, negative family interaction) that in turn were correlated with the age 48 outcomes. Thus, it is unclear from the correlations alone what the unique contribution is to long-term educational and occupational success of parental education. In the next section, we present results of structural models in which we tested unique direct and indirect effects (through hypothesized age 8 and age 19 mediators) of parental education when the child was 8 years old.

### *Direct and Indirect Long-term Effects of Parents' Education on Children's Educational and Occupational Success*

For each of the two adult outcome variables (educational level and occupational prestige), a two-group (males, females) structural equation model was constructed in which the age 48 outcome variable was directly predicted from the three hypothesized age 19 mediator variables (educational and occupational aspirations, educational level); next, both the age 48 outcome variable and the three mediators were directly predicted from the two hypothesized age 8 mediator variables (negative family interaction, child aggression); and finally, the dependent variable and the three age 19 and two age 8 mediators were directly predicted from the four exogenous age 8 variables (parental educational level, father's occupation, value of housing,

**Table 1.** Correlations among the Middle Childhood Variables, Late Adolescent Educational Achievement and Aspirations, and the Adult Outcomes

Variables	1	2	3	4	5	6	7	8	9	10	11
<i>Middle childhood variables</i>											
1. Parents' educational level		.47***	.31***	.35***	-.03	-.14***	.40***	.41***	.21**	.29***	.14*
2. Father's occupation	.45***		.24***	.13**	-.07	.04	.25***	.20**	.21**	.26***	.16*
3. Value of housing	.35***	.20***		.29***	-.11**	-.13**	.34***	.37***	.23**	.34***	-.02
4. Child's IQ	.31***	.10	.36***		-.12**	-.34***	.23***	.27***	.16*	.38***	.32***
5. Negative family interaction	.01	-.04	-.05	-.12**		.34***	-.15**	-.18**	-.09	-.17**	-.14*
6. Child's aggression	-.05	.04	-.17***	-.28***	.17***		-.22***	-.25***	-.06	-.32***	-.16**
<i>Late adolescent educational achievement and aspirations</i>											
7. Educational aspirations	.30***	.17**	.23***	.35***	-.12	-.10		.72***	.55***	.74***	.27***
8. Educational level	.21***	.07	.17**	.35***	-.10	-.20***	.71***		.46***	.61***	.28***
9. Occupational aspirations	.21***	.06	.24***	.24***	.02	-.16**	.63***	.43***		.31***	.02
<i>Adult outcomes</i>											
10. Educational level	.38***	.23***	.18***	.35***	-.19***	-.21***	.60***	.56***	.41***		.44***
11. Occupational prestige	.25***	.22***	.14*	.28***	-.18**	-.26***	.33***	.37***	.27***	.60***	

*Note.* Correlations for females are above the diagonal; correlations for males are below the diagonal. *N*s vary due to missing data. For females, *N*s range from 105 to 420. For males, *N*s range from 127 to 434.

\* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

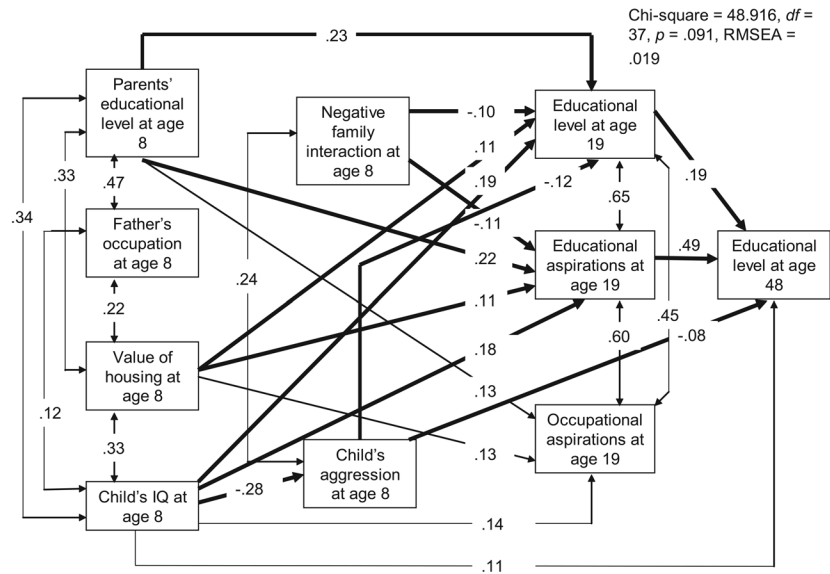
child IQ). The four exogenous age 8 variables were allowed to covary with each other. The two residuals associated with the two age 8 hypothesized mediators (negative family interaction, child aggression) were allowed to covary with each other but not with any of the other residuals, and similarly, the three residuals associated with the three age 19 hypothesized mediators (educational and occupational aspirations, educational level) also were allowed to covary with each other but not with any of the other residuals. The path coefficients and covariances then were estimated with AMOS 4.01 (Arbuckle & Wothke, 1999) using full information maximum likelihood estimation.

First, we estimated the model with all the parameters allowed to be different for each gender. We then constrained the models to have the same parameters for each gender and compared the fit statistics. The unconstrained model did not fit significantly better in either case, and for both outcome variables the chi-square ( $\chi^2$ ) goodness-of-fit test statistics indicated that these constrained models were a good fit to these data (educational level:  $\chi^2 = 48.916$ ,  $df = 37$ ,  $p = .091$ , RMSEA = .019, CFI = .991; occupational prestige:  $\chi^2 = 41.466$ ,  $df = 37$ ,  $p = .282$ , RMSEA = .012, CFI = .996).<sup>2</sup> In other words, there are no significant differences between males and females in how occupational and educational success at age 48 are predicted from the age 8 and age 19 variables in the models. As these constrained models with identical parameters for males and females are more parsimonious than the unconstrained models and are no worse in predicting our outcomes, we present them below.

The calculated model for predicting adult educational level is shown in Figure 1, and the model for predicting adult occupational prestige is shown in Figure 2. In the figures we include the significant paths between variables. In addition, because these models indicated no gender differences, we present the average of the standardized path coefficients for males and females in the figures. However, for the interested reader, in the accompanying Tables 2 and 3, we present standardized mediated, direct, and total effects for the age 8 predictor variables in the model.

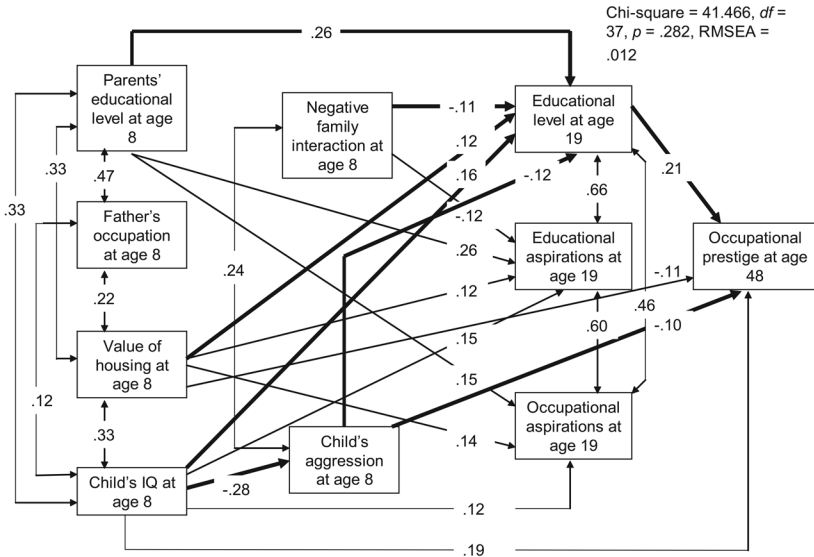
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<sup>2</sup> In the captions to the figures depicting the results of our structural models computed with AMOS, we present, in addition to the chi-square, the root mean square error of approximation (RMSEA), confirmatory fit index (CFI) statistics, and the squared multiple correlation (SMC) values (SMC for males and females separately). Recent research and theory (McDonald & Ho, 2002) indicate that these indicators are sufficient for describing the fit of structural models. Nonsignificant chi-square values along with CFI values >.90 and RMSEA values <.05 indicate good model fit. However, we recognize that other fit indices can be of interest; interested readers may contact the first author to obtain information on other fit statistics.



**Figure 1.** Predicting child's age 48 education level from parents' education, other indices of socioeconomic status, and child IQ: Mediation by family interactions, child aggression, and teenage aspirations. The model did not fit significantly better if paths were unconstrained between genders, so all paths were equated across gender. Thus, the unstandardized path coefficients are the same for each gender, but for ease of interpretation we display the (unweighted) averages of the standardized path coefficients for males and females. Note that the standardized coefficients are slightly different for males and females due to gender differences in the standard deviations of the variables. All age 8 to age 19 and age 19 to age 48 paths were included in the model, but the nonsignificant paths are not displayed. Significant indirect paths from age 8 to age 48 are shown in bold. Model fit statistics:  $\chi^2 = 48.916$ ,  $df = 37$ ,  $p = .091$ ,  $RMSEA = .019$ ,  $CFI = .991$ ; squared multiple correlation = .61 for females and .50 for males.

*Predicting adult educational level.* As Figure 1 and Table 2 show, parental educational level during childhood had no direct effects on educational level at age 48 but had significant indirect effects mediated through age 19 educational aspirations and age 19 educational level. Thus, children with more highly educated parents developed higher aspirations for their own education and attained more education by age 19, which in turn related to higher levels of adult educational attainment. The effects of parents' educational level on the child's age 48 educational attainment were not mediated through negative family interaction or through child aggression as predicted. At the same time, children's intelligence and aggressiveness had both significant direct and indirect effects on their educational attainment



**Figure 2.** Predicting child's age 48 occupational prestige from parents' education, other indices of socioeconomic status, and child IQ: Mediation by family interactions, child aggression, and teenage aspirations. The model did not fit significantly better if paths were unconstrained between genders, so all paths are equated across gender. Thus, the unstandardized path coefficients are the same for each gender, but for ease of interpretation we display the (unweighted) averages of the standardized path coefficients for males and females. Note that the standardized coefficients are slightly different for males and females due to gender differences in the standard deviations of the variables. All age 8 to age 19 and age 19 to age 48 paths were included in the model, but the nonsignificant paths are not displayed. Significant indirect paths from age 8 to age 48 are shown in bold. Model fit statistics:  $\chi^2 = 41.46$ , *df* = 37, *p* = .282, RMSEA = .012, CFI = .996; squared multiple correlation = .24 for females and .21 for males.

40 years later. The indirect effects were again mediated through educational aspirations (for IQ) and attainment (for IQ and aggression) in late adolescence. Additionally, IQ also had an effect on educational level at age 48 that was mediated through age 8 aggression. Finally, both negative family interactions and value of the family housing when the child was 8 also had independent indirect effects on eventual educational attainment in the directions that one would expect. Table 2 shows the exact standardized mediated, direct, and total effects for the age 8 predictor variables. The largest total effects of middle childhood variables on adult educational attainment are +.22 for parent education and +.28 for IQ. The total effect for aggression was the next largest at -.12, and negative family interactions also was significant at -.12.



**Table 2.** Predicting Adult Educational Level: Standardized Direct, Mediated, and Total Effects of Age 8 Predictor Variables on Age 48 Educational Attainment for the Model in Figure 1

Predictor Variable at Age 8	Combined Mediated Effects 8→48	Direct Effect 8→48	Total Effect 8→48
Parent educational level	<b>.15</b>	.07	.22****
Father’s occupation	.03	.03	.06
Value housing	<b>.09</b>	.00	.09*
Negative family interaction	<b>-.07</b>	-.05	-.12***
Child IQ	<b>.16</b>	.12***	.28****
Child aggression	<b>-.04</b>	-.08**	-.12****

*Note.* Significance of individual mediated effects is noted in Figure 1. Combined mediation effect is in bold if any one mediated path to age 48 is significant.

\* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ , \*\*\*\* $p < .001$ .

**Table 3.** Predicting Adult Occupational Prestige: Standardized Direct, Mediated, and Total Effects of Age 8 Predictor Variables on Age 48 Occupational Status for the Model in Figure 2

Predictor Variable at Age 8	Combined Mediated Effects 8→48	Direct Effect 8→48	Total Effect 8→48
Parent educational level	<b>.07</b>	.04	.11**
Father’s occupation	-.01	.11**	.10*
Value housing	<b>.06</b>	-.11**	-.05
Negative family interaction	<b>-.04</b>	-.07	-.11**
Child IQ	<b>.10</b>	.19***	.29***
Child aggression	<b>-.03</b>	-.10**	-.13***

*Note.* Significance of individual mediated effects is noted in Figure 2. Combined mediation effect is in bold if any one mediated path to age 48 is significant.

\* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .001$ .

*Predicting adult occupational prestige.* As Figure 2 shows, parental educational level during childhood had a significant indirect effect on adult occupational prestige, mediated through its effect on age 19 educational attainment. Thus, children with more highly educated parents attained more education by age 19, which in turn related to higher levels of adult occupational prestige. The effects of parents' educational level on the child's age 48 occupational prestige were not mediated through negative family interactions or through child aggression as predicted. Age 8 intelligence and aggressiveness had indirect effects on age 48 occupational success mediated through late adolescent educational attainment. However, these two personal variables also had significant direct effects on age 48 occupational success and on age 48 educational attainment. Furthermore, age 8 IQ also had a mediated effect through age 8 aggression onto age 48 occupational prestige. Finally, both negative family interactions and value of the family housing when the child was 8 had independent indirect effects on age 48 occupational prestige mediated through late adolescent educational attainment. Surprisingly, the direct path coefficient for value of family housing on occupational prestige is negative even though the correlation between them is positive and the indirect effect of value of housing on occupational prestige (through educational level) is positive. This suggests that the path is acting as a suppressor path to reduce the effect suggested by the indirect path. Table 3 shows the exact standardized mediated, direct, and total effects for the age 8 predictor variables. As this table indicates, the largest total effects on age 48 occupational prestige from age 8 are for age 8 IQ (.29) and age 8 aggression (–.13). However, there are also significant total effects for the parents' education level (.11) and for negative family interactions when the child was age 8 (–.11).

## Discussion

This investigation considered the role of parents' education levels in shaping their children's future educational and occupational success. We examined the prediction of educational and occupational attainment in middle adulthood from parental education along with a variety of other contextual and personal variables assessed in middle childhood. We also examined the extent to which the effects of the parents' education and other middle childhood factors on adulthood outcomes were mediated by the child's educational attainment and future aspirations during late adolescence. Independently of other middle childhood family contextual factors and child IQ and aggressiveness, parental education measured in middle childhood accounted for educational and occupational success at age 48. Importantly, the effects of parental educa-

tion were entirely indirect: higher levels of parental education led to higher levels of optimistic educational aspirations or educational attainment in adolescence and subsequently to higher educational attainment or more prestigious occupational status in adulthood.

### *Mediation of Parent Education Effects*

Following the family stress perspective (e.g., Conger et al., 2002), we predicted that parent education effects (and other family SES indices) would be mediated by negative family interactions and child aggression. This prediction was not supported, because parent education was not related to either of these concurrently measured variables when other middle childhood variables (other indices of parent SES and child IQ) were included in the model. However, as expected, we did find that negative family interactions and child aggression were related and that these two variables had indirect or direct effects on adult educational attainment and occupational prestige. Our reasoning was that the bidirectional interplay between child behavioral problems and negative family interactions would impair children's academic and intellectual development over time because aggressive youths in conflictual relationships with parents and possibly teachers might develop negative attitudes toward school, encounter reduced learning opportunities, and in turn have lower academic success (e.g., Huesmann et al., 1987; Stipek, 1998).

We also expected that parent education would be linked to the child's developing academic success and achievement-oriented attitudes, which in turn would be linked to higher levels of adult educational and occupational attainment. Indeed, our structural models supported this prediction even when controlling for other indices of family SES (i.e., value of family housing, father's occupation) and child personal variables (i.e., IQ and aggressiveness). That is, the total (mediated plus direct) effects of the other family SES indices were small compared to the total effects of parent education. Our findings with respect to the effects of parent education on adolescent aspirations and educational attainment are in line with extant research and theory in this area (e.g., Duncan et al., 1994; Mistry et al., 2002) and expand this literature base by providing evidence of substantially longer-term relations than typically have been reported. Parental education and value of family housing each exerted effects on late adolescent educational and occupational aspirations and educational attainment for both males and females. In the relative short term (i.e., childhood to late adolescence), then, indicators of family socioeconomic stress can be important predictors of youths' achievement-related functioning. Over the longer term, however,

parental education level is the more robust predictor of adult educational and occupational attainment.

### *Parents as Expectancy Socializers*

The finding that parental education was the strongest of the family SES predictors of educational and vocational achievement in adulthood is in accordance with Eccles's expectancy-value theory of achievement (e.g., Eccles, 1993; Frome & Eccles, 1998). Eccles's model proposes that parents socialize their children toward higher levels of educational achievement and occupational success by modeling achievement-related behaviors and fostering positive expectations for academic performance. Our results support this view by casting parental education as a marker for those achievement-related factors during childhood. Parental education predicted both educational and occupational aspirations as well as educational attainment during late adolescence. Although aspirations in our study were not assessed until late adolescence, our findings are consistent with recent analyses of data from the Michigan Study of Adolescent Life Transitions ( $N = 681$ ) presented by Eccles et al. (2004) showing that maternal education was significantly linked to 6th-grade children's plans for attending college. Those aspirations indirectly predicted college status (whether the individual was attending college full-time) through 12th-grade grade point averages. Thus, it appears that achievement-related aspirations play a significant role, and their influence emerges at least by middle school and continues into late adolescence.

Our findings extend those of Eccles et al. (2004) by demonstrating that achievement-related aspirations and actual achievement behavior have important implications well beyond the late adolescent years. Our findings also support the broader cognitive-ecological view (Guerra & Huesmann, 2004), which emphasizes the developmental impact of childhood environments on shaping enduring cognitive styles and subsequent educational and behavioral outcomes.

### *Achievement Aspirations and Developmental Turning Points*

Although our analyses are limited by the ages (and thus developmental levels) of our participants due to the sampling design of the CCLS, the 1970 sampling period yielded information relevant to current theorizing about the developmental importance of emerging adulthood or the transition to young adulthood (spanning approximately ages 18 to 25) (Arnett, 2000; Eccles, Templeton, & Barber, 2003; Schulenberg, Wadsworth, O'Malley,

Bachman, & Johnston, 1996). Those authors highlighted this period of development due to its uniqueness from adolescence and adulthood in terms of demographics, subjective perceptions, and identity development issues (Arnett, 2000). At age 19, our participants were on the cusp of the transition between adolescence and adulthood.

In the context of the present article, it is important to note that the transition to adulthood is a time period during which critical and potentially long-standing career decisions are made. Thus, even though cognitive-ecological models typically propose that children's beliefs and values are shaped in early to middle childhood and begin to predict behavior reliably thereafter (Huesmann, 1998; Huesmann & Guerra, 1997), certain cognitions (i.e., expectations or aspirations for achievement) might not produce long-term and direct effects until such time as the behaviors to which they are linked become salient. In this view, and in consideration of theory advanced by Schulenberg and others (Schulenberg et al., 1996; Schulenberg, Maggs, & O'Malley, 2003), the transition to adulthood can represent a developmental turning point (Rutter, 1996; Rönkä, Oravala, & Pulkkinen, 2002) during which aspirations related to educational and vocational achievement might be expected to exert their greatest influence. For example, if an individual who has been achieving at an average level or has been locked into a constraining academic track maintains high aspirations for educational success, this transitional period might present the opportunity to pursue those aspirations through new and better-suited learning experiences. Following Figure 1, the single strongest predictor of age 48 educational attainment is age 19 educational aspirations. Thus, it is tenable to propose that high aspirations coupled with the variation in life choices and opportunities afforded by the transition to adulthood potentially can improve a low-achieving trajectory established in childhood and earlier adolescence. Research needs to examine alternative learning opportunities and choices during middle to late adolescence that might lead some youths to maintain high educational aspirations (e.g., aspirations to seek a college or graduate degree) despite average or lower levels of achievement performance trajectories.

### *Summary and Conclusions*

The results of this study suggest that the beneficial effects of parental educational level when the child is young are not limited to academic achievement throughout the school years but have long-term implications for positive outcomes into middle adulthood (i.e., higher educational level, more prestigious occupations). The positive effects of parental education

are independent of other indices of parental SES (i.e., father's occupation, value of housing) and family process variables (i.e., negative family interactions), the positive effects of higher IQ, and the negative effects of child aggressiveness. The long-term positive effects of parent education appear to be indirect—mediated through adolescent aspirations and educational attainment—in contrast to the direct long-term effects of the child personal variables (IQ and aggressiveness).

In line with longitudinal studies spanning a shorter time frame (e.g., into adolescence), we found that parental education affects children's aspirations for their own education as well as their actual educational achievement through adolescence. Because of the long interval between our child and adolescent assessments (age 8 and age 19), we were unable to examine the proximal processes that might account for the effects of parental education on the child's developing aspirations and achievement. Other research (e.g., Alexander, Entwisle, & Bedinger, 1994; Davis-Kean, 2005; Klibanov, Brooks-Gunn, & Duncan, 1994; Smith et al., 1997) has shown that parental education is linked to the parents providing a more stimulating physical, cognitive, and emotional environment in the home and more accurate beliefs about their children's actual achievement. These proximal processes likely affect the developing child's achievement-related aspirations and actual achievement behavior.

Because we did not assess shorter-term and more proximal influences on individual development over time, our ability to evaluate directly the process-oriented family stress models proposed by Conger, McLoyd, and others (e.g., Conger et al., 2002; McLoyd, 1998) was limited. As noted, we did not find SES effects on child outcomes mediated by negative family interactions. However, our childhood measures of family of origin SES were not direct assessments of socioeconomic stress (e.g., financial strain on the family, lack of material resources) but rather value of housing and parents' educational levels. Also, those variables were assessed contemporaneously, and thus we could not examine the causal processes implied by the family stress view. Furthermore, it is worth noting that because we essentially were examining intergenerational socialization processes, the role of genetic inheritability in accounting for relations over time cannot be ruled out.

The unique effects of parent education when the child is young have important implications for social policy. As Davis-Kean (2005) suggested, increasing parental education would have more permanent effects than supplemental income programs, and Magnuson and McGroder (2001) have demonstrated short-term benefits on children's achievement through an intervention that led to relatively small increases in parental education. The

results of ongoing public policy intervention studies aimed at enhancing the economic well-being of families will no doubt continue to inform this debate (e.g., Magnuson, 2004; Morris, Huston, Duncan, Crosby, & Bos, 2001; Morris & Michalopoulos, 2003).

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